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(54) A thermally controlled valve

(57) In a thermally controlled valve, particularly for condensate, having a diaphragm capsule (5) comprising a rigid wall part (6) and a diaphragm element (7) for actuating a closure member (9), a relatively great closing force has to be transmitted from the diaphragm element (7) onto the closure member (9) in order to close the valve against the opening force of a spring. High stresses which impair the service life of the diaphragm therefore occur in the diaphragm element. A long diaphragm service life is achieved by means of the valve according to the invention in that the spring is constructed as a Belleville spring washer (14) which cooperates with the closure member (9) and supports the diaphragm element (7) over a large area against the internal pressure of the diaphragm capsule (5) throughout its entire travel.

Fig. 3

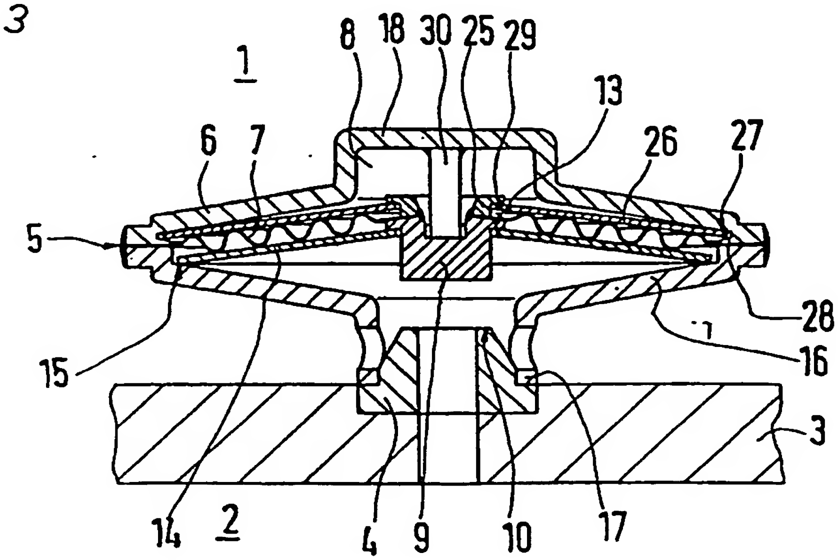

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Fig. 1

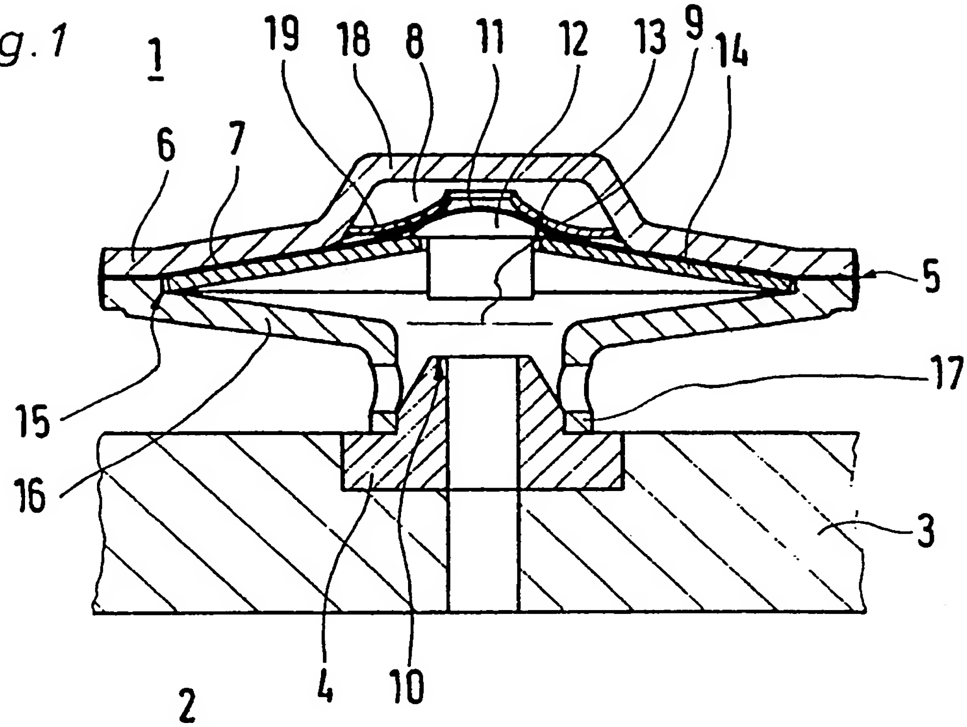
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Fig. 2

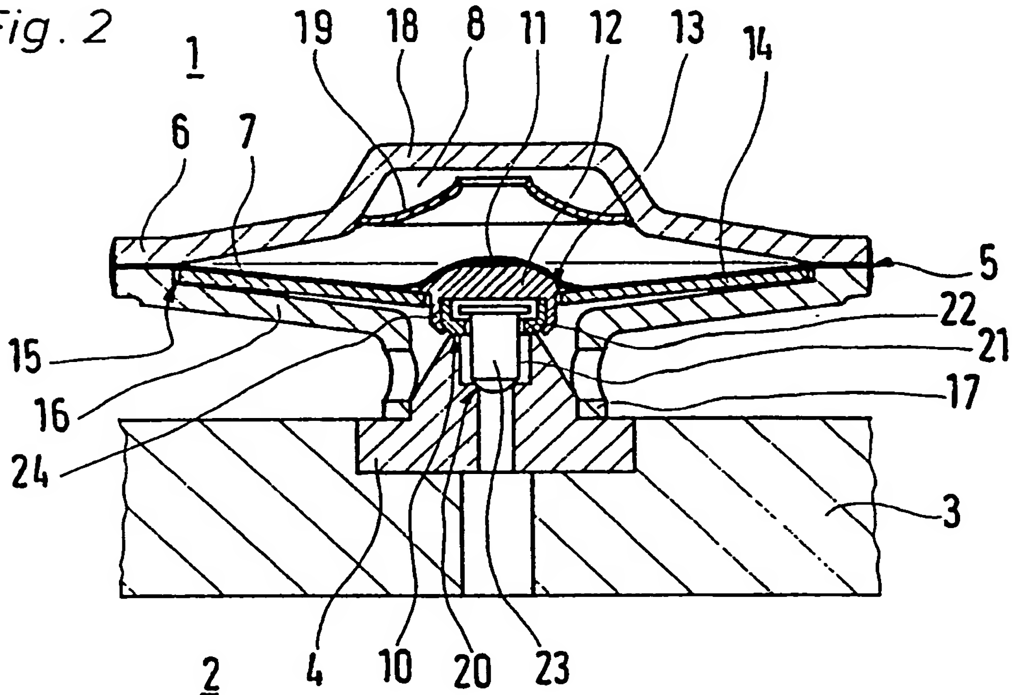
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Fig. 3

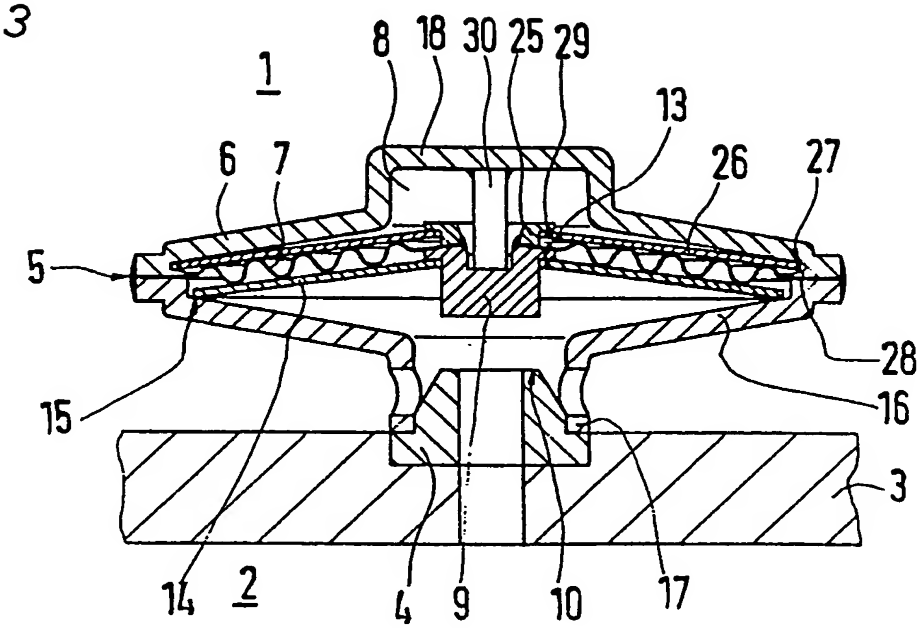


Fig. 4

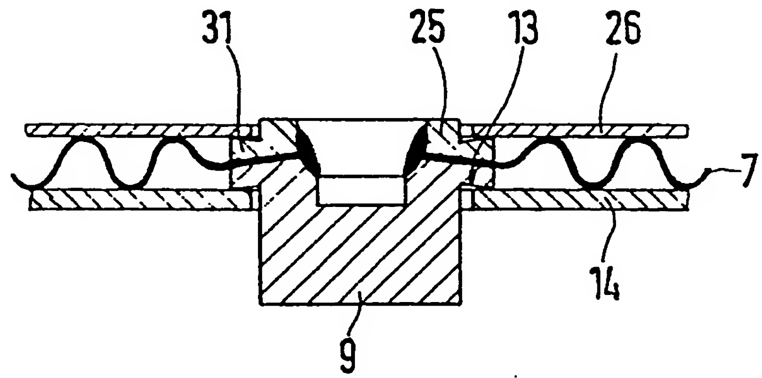


Fig. 5

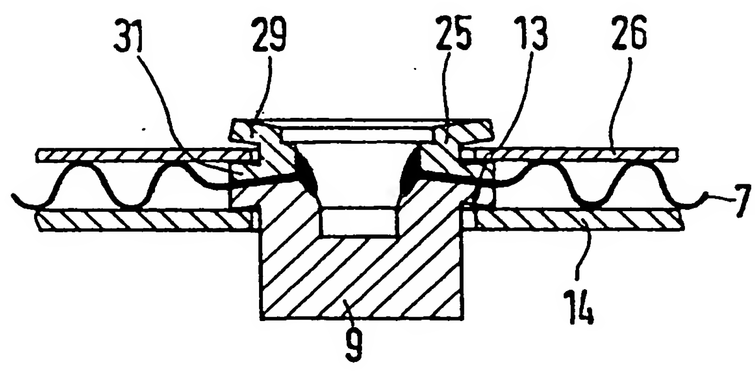
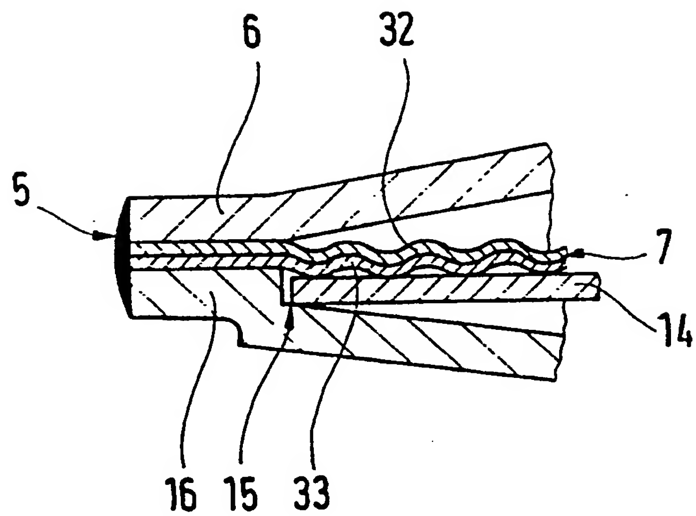


Fig. 6



Title: A thermally controlled valve.

This invention relates to a thermally controlled valve, in particular condensate diverter, of the type comprising a valve seating, a closure member cooperating with the valve seating, a diaphragm capsule having a rigid wall part and a diaphragm element actuating the closure member, a spring acting in the opening direction on the closure member and an abutment for the spring.

The spring acting on the closure member in the opening direction in these valves affords the advantage that the valve adopts the open position in the event of a leakage of the diaphragm capsule - that is to say during a failure thereof. This behaviour is recommended for some applications for reasons of process engineering.

To guarantee this behaviour over the entire pressure range of the valve, the spring must be designed such that it can overcome the great closing force of the closure member resulting from the highest pressure in the event of a leakage. If such a valve is to close with an intact diaphragm capsule at the highest pressure, a relatively small closing force of the diaphragm capsule is sufficient. This closing force is transmitted to the closure member by the diaphragm element. If the valve is used at low pressure, the closing force of the closure member is also low. However, the value of the spring force is not reduced. A relatively great force has to be transmitted by the diaphragm element to close the valve in this case.

However, a great force produces high stresses in the diaphragm element. The pressure range or the service life of the diaphragm of the known designs (DE-PS 23 513) of this valve is therefore restricted.

The present invention aims to provide a thermally controlled valve of the type mentioned at the outset which is suitable for a large pressure range and is distinguished by a long service life of the diaphragm.

Accordingly, the present invention provides a thermally controlled valve, in particular a condensate diverter, comprising a valve seating, a closure member co-operating therewith, a diaphragm capsule having a rigid wall part and a diaphragm element actuating the closure member, the wall part and the diaphragm element forming a receiving chamber for a vaporising medium and being joined together in their outer edge region, a spring acting in the opening direction on the closure member and an abutment for the spring, wherein the spring is constructed as a Belleville spring washer which is arranged to rest on the face of the diaphragm element remote from the wall part, the outer edge region of the Belleville spring washer resting on the abutment while the internal edge region of the Belleville spring washer acts upon the closure member or a closure member carrier connected thereto.

The diaphragm element is supported in any reciprocating position over its entire radial extension by the Belleville spring washer which has a small overall height. The closing force resulting from the pressure difference prevailing between the receiving chamber of the diaphragm capsule and the high pressure side is transmitted directly onto the Belleville spring washer and the closure member. The relatively high stresses occurring in the diaphragm element if this force were transmitted by the diaphragm element itself are avoided. The diaphragm element is subjected substantially only to the relatively slight stress originating from the reciprocating motion. The valve according to the invention is therefore suitable for

a large pressure range and is characterised by a long service life of the diaphragm.

According to one embodiment of the invention, the abutment consists of an annular disc which is rigidly connected at its outer edge to the diaphragm capsule and, on its side facing the diaphragm capsule, has a recess receiving the Belleville spring washer. With this arrangement, the diaphragm capsule, the closure member, the Belleville spring washer and the abutment form a unit which can be prefabricated as a whole. In addition, the abutment limits the travel of the Belleville spring washer and therefore also the travel of the diaphragm element in the closing direction. The diaphragm capsule therefore withstands a very high internal pressure which can occur, for example, due to pronounced over-heating.

Preferably, the diaphragm element is provided with a central cap-shaped bearing depression and the closure member or a closure member carrier connected to it has a head which is arranged in the bearing depression and is provided, on the edge of the bearing depression, with an axial working face for the Belleville spring washer. Reliable centering of the closure member in the proposed installation position is achieved with this arrangement. The shaping is particularly desirable so the diaphragm element does not have undesirable inherent stresses.

A particularly flat diaphragm capsule which withstands very high external pressure can be obtained if the wall part of the diaphragm capsule is plate-shaped in construction and is provided with a central, pot-shaped, convex curvature whose internal diameter is greater

than the external diameter of the closure member or of a closure member carrier connected to it and if a stop member for the diaphragm element is arranged substantially stationarily in the convex curvature. With a small height, the convex curvature of the wall part affords adequate room for receiving the vaporising medium. The diaphragm element is supported in its bending zone and in the region of the closure member in the open position by the wall part and stop part. The diaphragm capsule is therefore resistant to very high external pressure of the type occurring, for example, due to water shock. Preferably, the stop member comprises a plate whose outer edge is held stationarily on the wall part in the edge region of the convex curvature.

The Belleville spring washer desirably comprises a snap spring which is arranged such that it occupies a travel position located in the range of travel between the force maximum and the force minimum of its force/path characteristic curve in the closed position of the valve. The snap spring is preferably monostable. With monostability, the direction of the spring force is invariably the same over the travel. For example, there is no reversal from compressive to tensile stress. The opening force exerted on the closure member by the snap spring drops during the closing travel from a wide open position to the closed position of the closure member. During the opening travel, it increases from the closed position to a wide open position. When the opening temperature is reached, the closure member therefore jumps into a wide open position. This is an open position which exceeds the size required for constant discharge and aimed at by the resilient diaphragm capsule in the case of small quantities. A small quantity of medium will consequently be conveyed

through in the shortest possible time. The valve then closes suddenly from a wide open position. Wear promoting throttled positions of the closure member are avoided by using a snap spring instead of a conventional spring - a so-called crawling spring.

The pressure difference permitted for the diaphragm element and, in this respect, also the pressure range of the valve could theoretically be increased to very high values by using a Belleville spring washer with correspondingly very high opening spring force. This spring force has to be overcome by the pressing force of the vaporising medium in order to close the valve. In the lower portion of the pressure range, this has to take place at correspondingly low temperatures. Limits are imposed on the pressure range owing to the absence of suitable vaporising media.

An increase in the pressure range beyond these limits can be achieved according to another embodiment of the invention in which the thermally controlled valve further comprises a second Belleville spring washer resting on the face of the diaphragm element directed toward the wall part and an abutment for the outer edge region of the second Belleville spring washer.

The additional, second Belleville spring washer now allows the diaphragm element to rest over its entire radial extension - i.e. from the external to the internal edge - even in the opening direction. An opening force resulting from a pressure difference prevailing at the diaphragm element is transmitted directly onto the second Belleville spring washer and the closure member. No high, harmful stresses occur in the diaphragm element. The pressure range of the valve can therefore be increased

substantially beyond the range attainable with the available vaporising media with arrangement of only the first Belleville spring washer.

The second Belleville spring washer may be constructed as an opening spring and the closure member may have a driver which engages behind the internal edge region of the second Belleville spring washer on its face remote from the diaphragm element. With this arrangement, the spring force of each of the two Belleville spring washers is directed in the opening direction of the closure member. In the open position of the valve, the second Belleville spring washer can be either relaxed or pre-stressed. The spring force produced by the second Belleville spring washer and a pressing force possibly transmitted onto the second Belleville spring washer by the support of the diaphragm element is exerted on the closure member via the driver.

Owing to the distribution of the opening spring force over two Belleville spring washers, the stresses in the individual Belleville spring washers are particularly low so that their service life is particularly long.

It is possible to select a low spring force for the second Belleville spring washer. However, it has to be sufficiently high to guarantee the supporting function of the Belleville spring washer in the upper partial range of the pressure range of the valve. A second Belleville spring washer dimensioned in this way can rest with its outer edge directly on the diaphragm element without affecting the service life thereof. An abutment, facing the diaphragm, for the outer edge of the second Belleville spring washer is superfluous in this case. On the other hand, such an abutment

should be provided if the opening spring force of the second Belleville spring washer is great.

According to an alternative arrangement, the second Belleville spring washer is constructed as a closing spring. In this case, the forces of the two Belleville spring washers counteract one another. Belleville spring washers with particularly great spring force and consequently particularly great supporting capacity can therefore be used.

This allows an extremely large pressure range. Owing to the mutual compensation of the spring forces, the resultant spring force exerted on the closure member by the Belleville spring washers can be very low. Despite the particularly great supporting effect, it can lie in the range of values imposed by the available vaporising media.

A particularly simple design of carrier can be provided if the closure member has a driver which engages behind the internal edge region of the second Belleville spring washer on its face remote from the diaphragm element. It is preferably used if the minimum closing force of the second Belleville spring washer is selected, i.e. only sufficiently great to produce sufficient supporting capacity to support the diaphragm element in the entire upper partial range of pressure. The opening force to be transmitted by the second Belleville spring washer is introduced into the closure member by the carrier. Owing to its low closing force, the second Belleville spring washer can rest with its internal edge region directly on the diaphragm element to close the valve in the lower partial range of pressure, without affecting the service life thereof.

Alternatively, the closure member may have a driver which engages behind the internal edge region of the second Belleville spring washer on its face turned toward the diaphragm element. The carrier proposed in this arrangement prevents the second Belleville spring washer from resting with its internal edge region directly on the diaphragm element. This is particularly advantageous if the second Belleville spring washer has a very great closing force. If, with this carrier design, the second Belleville spring washer performs a movement in the opening direction of the closure member owing to the pressure difference prevailing on the diaphragm element in the upper partial range of pressure, the closure member directly follows the second Belleville spring washer under the opening effect of the first Belleville spring washer. Although the second Belleville spring washer cannot exert an opening force on the closure member with this design of carrier, perfect opening of the valve is still guaranteed.

Both of the above-mentioned advantages can be achieved if the closure member has drivers which engage behind the internal edge region of the second Belleville spring washer on both of its faces.

According to a further preferred embodiment of the invention, each Belleville spring washer has a force/path characteristic curve with a flat characteristic curve region, and the two Belleville spring washers are arranged such that they each occupy travel positions in their flat characteristic curve region both in the valve closing position and in the valve opening position. This arrangement enables the spring forces exerted on the closure member by the two Belleville spring washers almost to compensate one another over the entire travel of the closure member. This is highly advantageous when selecting the vaporising medium.

The wall part of the diaphragm capsule desirably comprises the abutment for the second Belleville spring washer. Preferably, this wall part is constructed in the form of a plate and, on its side facing the diaphragm element, has a recess receiving the second Belleville spring washer.

The wall part may have stop means which co-operate with the closure member and limit the opening travel thereof. These stop means absorb the opening forces in the open end position of the closure member. This is particularly advantageous if the spring travel has to be smaller, for example for reasons of strength, than that permitted by the form of the wall part.

The invention will now be further described, by way of example, with reference to the drawings, in which:-

Figure 1 is a vertical section through one embodiment of a valve according to the invention, in the open position;

Figure 2 is a vertical section through a second embodiment of a valve according to the invention, in the closed position;

Figure 3 is a vertical section through a third embodiment of a valve according to the invention, in the open position;

Figure 4 shows a detail of the diaphragm capsule of the valve shown in Figure 3 according to a different design and in a partially open position;

Figure 5 shows a detail of a further design of the diaphragm capsule for the valve shown in Figure 3; and

Figure 6 shows a detail of the diaphragm capsules of the valves shown in Figures 1 and 2 in a partially open position.

In the drawings, like parts are denoted by like reference numerals.

In Figure 1, a partition wall 3 of a valve housing (not shown) provided between the high pressure side 1 and the low pressure side 2 carries a seating element 4. A diaphragm capsule 5 having a rigid wall part 6 and a diaphragm element 7 is arranged on the high pressure side 1, i.e. upstream of the seating element 4. The rigid wall part 6 and the diaphragm element 7 form a receiving chamber 8 for a vaporising medium. The diaphragm element 7 actuates a closure member 9 located upstream of the seating element 4. A valve seating 10 for the closure member 9 is provided on the seating element 4.

The diaphragm element 7 has a cap-shaped bearing depression 11 at its central region which extends into the receiving chamber 8. A cup-shaped head 12 of the closing member 9 which can either be rigidly connected to the diaphragm element 7 or - as in the present case - merely rest against it, is located in the bearing depression 11. At the level of the edge of the bearing depression 11, the head 12 has an axial working face 13. A Belleville spring washer 14 acts thereon in the opening direction with its internal edge. At the same time, the Belleville spring washer 14 rests on the face of the diaphragm element 7 remote from the wall part 6. With its outer edge remote from the diaphragm, it is supported in a recess 15 in a concavely curved annular disc 16 acting as an abutment. On its inner edge, the annular disc 16 is provided with holding means 17 which rest on the seating

element 4. At its outer edge, the annular disc 16 is rigidly and tightly connected, preferably welded, to the diaphragm element 7 and the wall part 6.

The wall part 6 is plate-shaped in construction and is provided with a central, pot-shaped, convex curvature 18. Its internal diameter is substantially greater than the external diameter of the closure member 9. In this way, the convex curvature 18 affords an adequate receiving chamber 8 for the vaporising medium with a relatively small overhall height. A perforated plate 19 is located in the convex curvature 18. It is fixed on the wall part 6 in the edge region of the convex curvature 18, for example by spot welding.

In the cold state, the vaporising medium is condensed in the receiving chamber 8 and its vapour tension is virtually zero. The diaphragm element 7 and the closure member 9 are held in the open end position by the Belleville spring washer 14 and the pressure prevailing at the high pressure side 1. In this position, the diaphragm element 7 is supported over a large area by the wall part 6 and the plate 19. As the plate 19 also offers a contact face to the diaphragm element 7, even in its region extending over the closure member head 12, the closure member 9 is also supported via diaphragm element 7.

If the diaphragm capsule 5 is heated, for example by surrounding condensate, evaporation takes place in the receiving chamber 8. The vapour tension of the vaporising medium pertaining to the respective temperature forms therein. If the temperature and therefore the internal pressure of the receiving chamber 8 are sufficiently high, the diaphragm element 7 lifts from

the wall part 6 and the plate 19. The diaphragm element 7 thus rests on the Belleville spring washer 14 and the closure member head 12. With the appropriate rise in temperature and therefore internal pressure, the closure member 9 is moved via the diaphragm element 7 against the action of the Belleville spring washer 14 in the closing direction and is caused to rest tightly on the valve seating 10. Throughout the entire closing travel, the diaphragm element 7 is supported over a great area by the Belleville spring washer 14 and the closure member head 12. The closing force resulting from the pressure difference between the receiving chamber 8 and the high pressure side 1 is absorbed by the Belleville spring washer 14. The diaphragm element 7 is not stressed by it, but subjected merely to the relatively slight bending stresses resulting from the reciprocating movement. The diaphragm element 7 can therefore be used with high pressure differences and has a very long service life.

If the diaphragm capsule 5 is charged at the opening temperature, the internal pressure of the receiving chamber 8 drops sufficiently far for the opening force of the Belleville spring washer 14 to overcome the prevailing closing forces and the diaphragm element 7 as well as the closure member 9 to move into the open position. The diaphragm element 7 does not need to exert an opening force on the closure member 9. It cannot do so either since the closure member 9 has not been fixed on the diaphragm element 7.

On the other hand, if the closure member head 12 and the diaphragm element 7 are rigidly connected to one another, the diaphragm element 7 is capable of exerting an opening force on the closure member 9. Therefore,

the valve can still open if the Belleville spring washer 14 should be defective - i.e. broken or fatigued.

If the diaphragm capsule 5 is exposed to very high over-heating which leads to an extreme internal pressure, the annular disc 16 supports the Belleville spring washer 14 and therefore the diaphragm element 7. Consequently, the diaphragm element 7 is not overloaded in such a case either.

The embodiment shown in Figure 2 differs from that shown in Figure 1 by the arrangement of two closure members and two valve seatings. A further valve seating 20 is provided downstream of the valve seating 10. A chamber 21 extends between these two valve seatings. A first annular closure member 22 co-operates with the first valve seating 10. A second closure member 23 which is arranged in the chamber 21 and reciprocates to a limited extent relative to the first one co-operates with the second valve seating 20. The first closure member 22 is fixed tightly in a closure member carrier 24. The closure member carrier 24 has the head 12 mounted centrally in the bearing depression 11 and the working face 13 for the Belleville spring washer 14.

In the embodiment shown in Figure 2, the two closure members 22,23 open and close in succession with delay on the basis of their restricted relative travel. Intermittent operation is possible even with minimum quantities, and this prevents wear due to erosion at the checking points 10,22; 20,23.

In Figure 3, the closure member 9 and a driver carrier 25 are fixed rigidly and tightly on the centre of the diaphragm element 7, preferably by welding the three parts

together. The driver carrier 25 is located in the receiving chamber 8, that is to say on the side of the diaphragm facing the wall part 6. A closure member carrier carrying one or two closure members and having a working face 13 can be fixed on the diaphragm element 7, instead of the closure member 9, as in Figure 2. A second Belleville spring washer 26 is located between the diaphragm element 7 and the wall part 6 in the receiving chamber 8. The wall part 6 has a recess 27 serving as an abutment for the outer edge of the second Belleville spring washer 26 remote from the diaphragm. An abutment 28 is provided for its outer edge facing the diaphragm. The driver carrier 25 has a driver 29 engaging behind the internal edge region of the Belleville spring washer 26 on the face remote from the diaphragm. The spring force of the second Belleville spring washer 26 is directed in the opening direction of the closure member.

In the cold state, the diaphragm element 7 and the closure member 9 are held in the open end position by the two Belleville spring washers 14 and 26 as well as the pressure prevailing on the high pressure side 1. This open end position is defined by stop means 30 provided on the wall part 6. The stop means 30 act upon the closure member 9. Alternatively or also additionally they can act upon the driver carrier 25 rigidly connected to the closure member 9.

In the open end position, the diaphragm element 7 is supported over a large area by the second Belleville spring washer 26 against a pressure difference possibly acting in the opening direction.

If the diaphragm capsule 5 is exposed to a rising temperature, the vapour tension of the vaporising medium

pertaining to the respective temperature develops in the receiving chamber 8. The vapour tension produces a closing force on the closure member 9. The resultant spring force of the two Belleville spring washers 14 and 26 as well as the pressing force pointing in the opening direction when the diaphragm element 7 is laid on the second Belleville spring washer 26 counteracts this closing force. As soon as the vapour tension in the receiving chamber 8 exceeds the pressure on the high pressure side 1, the diaphragm element 7 lifts slightly from the second Belleville spring washer 26 and rests on the first Belleville spring washer 14. When the closing temperature is reached, the vapour tension in the receiving chamber 8 is so high that the closure member 9 moves against the resulting spring force of the two Belleville spring washers 14 and 26 in the closing direction and comes to rest tightly on the valve seating 10. The diaphragm element 7 is supported over a large area by the Belleville spring washer 14 throughout the entire closing travel.

If the diaphragm capsule 5 is charged at the opening temperature, the vapour tension in the receiving chamber 8 drops. The resultant spring force of the Belleville spring washers 14 and 26 acting in the opening direction then overcomes the closing forces dependent on the differential pressure. The diaphragm element 7 as well as the closure member 9 are therefore moved into the open position. The diaphragm element 7 is supported over a large area by the first Belleville spring washer 14.

The opening and closing operation in the lower partial region of the pressure range of the valve is described in the foregoing.

The lower partial pressure range covers any pressures at which the resultant spring force of the two Belleville spring washers 14 and 26 acting in the opening direction exceeds the closing force produced by the pressure on the closure member 9 at the closing temperature. The upper partial pressure range covers pressures at which the resultant spring force of the two Belleville spring washers 14 and 26 acting in the opening direction is lower than the closing force produced by the pressure on the closure member 9 at the closing temperature.

The mode of operation in the upper partial pressure range differs from that in the lower partial pressure range such that the diaphragm element 7 rests on the second Belleville spring washer 26 under the pressure difference which invariably prevails both during the opening travel and during the closing travel.

If a marked rise in pressure occurs in the closing direction in the receiving chamber 8, for example due to high over-heating, then the diaphragm element 7 rests on the first Belleville spring washer 14 even in the upper pressure range.

In the entire pressure range, the diaphragm element 7 is supported over a large area in each case both during the opening travel and during the closing travel and is subjected only to the slight bending stresses originating from the reciprocating motion. The second Belleville spring washer 26 has enabled the pressure range of the valve to be substantially increased upwards when using the available vaporising media.

In the embodiment according to Figure 3, the second Belleville spring washer 26 can be constructed,

alternatively, as a closing spring. The resultant spring force acting in the opening direction on the closure member 9 is thus reduced. This is advantageous when selecting the vaporising medium or the size of the pressure range. If the second Belleville spring washer 26 is constructed as a closing spring, the abutment 28 for the outer edge of the second Belleville spring washer 26 facing the diaphragm is superfluous. Operation otherwise corresponds to that already described with reference to Figure 3.

In the embodiment according to Figure 4, the second Belleville spring washer 26 is constructed as a closing spring. The driver carrier 25 has a driver 31 engaging behind the internal edge region of the Belleville spring washer 26 on its face directed toward the diaphragm. The internal edge region of the Belleville spring washer 26 does not therefore come to rest on the diaphragm element 7. This is advantageous, in particular, with high spring forces. If the second Belleville spring washer 26 travels in the opening direction owing to the pressure difference prevailing, the closure member 9 immediately follows the second Belleville spring washer 26 due to the action of the first Belleville spring washer 14. The above-mentioned advantages relating to pressure range and support of the diaphragm element 7 are also achieved with this design.

Since the spring forces of the two Belleville spring washers 14 and 26 counteract one another, Belleville spring washers 14 and 26 with very high spring forces can be used and reliably support the diaphragm element 7 even with an extremely high pressure difference. The resultant spring force acting in the opening direction on the closure member 9 is relatively low however. It has proved very advantageous to use Belleville spring

washers 14 and 26 whose characteristic curves run horizontally or flat in the travel range used, since the resultant spring force therefore remains substantially constant over the travel.

In the embodiment according to Figure 5, the second Belleville spring washer 26 is similarly constructed as a closing spring. However, the driver carrier 25 has a respective driver 29,31 on either side of the diaphragm element 7. Closing as well as opening forces can therefore be exerted directly on the driver carrier 25 and therefore on the closure member 9 by the Belleville spring washer 26.

In the valves according to the invention, the diaphragm element can consist of a single diaphragm or of several superimposed diaphragm plates. Diaphragm plates result in particularly high flexibility of the diaphragm element. The diaphragm or the diaphragm plates can also be smooth surfaced in construction or can be provided with concentric undulations. The undulations absorb the radial variations in size occurring during travel without warping the diaphragm element.

A diaphragm element 7 consisting of two superimposed diaphragm plates 32,33 with concentric undulations is preferred (see, for example, Figure 6). In the pre-curved state, more specifically in the open end position, the diaphragm element 7 is clamped between the wall part 6 and the annular disc 16 and is then welded to both. Tensile stresses are therefore avoided in the diaphragm element 7.

The Belleville spring washers 14 and 26 can be constructed without or with perforations or radial recesses.

CLAIMS

1. A thermally controlled valve, in particular a condensate diverter, comprising a valve seating, a closure member co-operating therewith, a diaphragm capsule having a rigid wall part and a diaphragm element actuating the closure member, the wall part and the diaphragm element forming a receiving chamber for a vaporising medium and being joined together in their outer edge region, a spring acting in the opening direction on the closure member and an abutment for the spring, wherein the spring is constructed as a Belleville spring washer which is arranged to rest on the face of the diaphragm element remote from the wall part, the outer edge region of the Belleville spring washer resting on the abutment while the internal edge region of the Belleville spring washer acts upon the closure member or a closure member carrier connected thereto.

2. A thermally controlled valve according to claim 1, wherein the abutment consists of an annular disc which is rigidly connected at its outer edge to the diaphragm capsule and, on its side facing the diaphragm capsule, has a recess receiving the Belleville spring washer.

3. A thermally controlled valve according to claim 1 or claim 2, wherein the diaphragm element is provided with a central cap-shaped bearing depression and the closure member or a closure member carrier connected to it has a head which is arranged in the bearing depression and is provided, on the edge of the bearing depression, with an axial working face for the Belleville spring washer.

4. A thermally controlled valve according to any preceding claim, wherein the wall part of the diaphragm capsule is plate-shaped in construction and is provided with a central, pot-shaped, convex curvature whose internal diameter is greater than the external diameter of the closure member or of a closure member carrier connected to it, and wherein a stop member for the diaphragm element is arranged stationarily in the convex curvature.

5. A thermally controlled valve according to claim 4, wherein the stop member comprises a plate whose outer edge is held stationarily on the wall part in the edge region of the convex curvature.

6. A thermally controlled valve according to any preceding claim, wherein the Belleville spring washer comprises a snap spring which is arranged such that it occupies a travel position located in the range of travel between the force maximum and the force minimum of its force/path characteristic curve in the closed position of the valve.

7. A thermally controlled valve according to claim 1 and further comprising a second Belleville spring washer resting on the face of the diaphragm element directed toward the wall part and an abutment for the outer edge region of the second Belleville spring washer.

8. A thermally controlled valve according to claim 7, wherein the second Belleville spring washer is constructed as an opening spring and the closure member has a driver which engages behind the internal edge region of the second Belleville spring washer on its face remote from the diaphragm element.

9. A thermally controlled valve according to claim 7, wherein the second Belleville spring washer is constructed as a closing spring.

10. A thermally controlled valve according to claim 9, wherein the closure member has a driver which engages behind the internal edge region of the second Belleville spring washer on its face remote from the diaphragm element.

11. A thermally controlled valve according to claim 9, wherein the closure member has a driver which engages behind the internal edge region of the second Belleville spring washer on its face turned toward the diaphragm element.

12. A thermally controlled valve according to claim 9, wherein the closure member has drivers, which engage behind the internal edge region of the second Belleville spring washer on both of its faces.

13. A thermally controlled valve according to any one of claims 9 to 12, wherein each Belleville spring washer has a force/path characteristic curve with a flat characteristic curve region, and the two Belleville spring washers are arranged such that they each occupy travel positions in their flat characteristic curve region both in the valve closing position and in the valve opening position.

14. A thermally controlled valve according to any one of claims 7 to 13, wherein the wall part of the diaphragm capsule comprises the abutment for the second Belleville spring washer.

15. A thermally controlled valve according to claim 14, wherein the wall part is constructed in the form of a plate and, on its side facing the diaphragm element, has a recess receiving the second Belleville spring washer.

16. A thermally controlled valve according to any one of claims 7 to 15, wherein the wall part has stop means which co-operate with the closure member and limit the opening travel thereof.

17. A thermally controlled valve substantially as described herein with reference to the drawings.

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